Statement of Work
July 2, 2014

NASA Goddard Space Flight Center seeks proposals to install a vacuum pipe into ground as part of an effort to upgrade an x-ray test beam line located at the NASA Goddard Geophysical and Astronomical Observatory, as shown in the site layout *VVP_site_GGAO.pdf,* Appendix A. The vacuum pipe is procured separately and shown in drawing *2188320.pdf,* Appendix B, which also shows the installed depth. The vendor shall conduct the following tasks:

1. Design and build the foundation and mechanism for installing and permanently anchoring the pipe into ground. The geology where the pipe is to be installed has been investigated and documented in the Geotechnical Engineering Report dated 2/3/2014 by GeoConcepts Inc. (*VVP_Geotechnical_Report.pdf,* Appendix C). The vendor is invited, but not required, to visit the site and communicate with facility management of Goddard Space Flight Center to gain more specific and detailed information about the site.
2. The work must proceed in two steps.
    a. In the first step, the vendor shall submit a design, which will be reviewed, revised if necessary, and approved by the Goddard Space Flight Center, meeting all applicable Federal, Maryland, and local regulations. In particular, the vendor shall conduct a structural analysis of the pipe for suitability of being installed and operated in the underground environment and specify any changes required to the nominal pipe design. The design documents for construction shall include the following items:
        i. Site and Layout Plan
        ii. Erosion and Sediment Control, including final stabilization of the disturbed area
    b. In the second step, the vendor shall mobilize equipment and workforce to implement the design. During implantation the vendor shall be responsible for removal and appropriate disposal of all waste and debris, including excavated soil, trees and brush, and excess drilling materials.
3. The vendor shall be responsible for obtaining any local, state, and federal permits necessary for the proposed construction.
4. The desired tolerances for the pipe installation are as follows:
   Location: ±3 inches
   Plumbness: ±1 percent
   Top of Pipe Elevation: ±1.5 inches
5. Third Party Inspections and Testing shall be performed by NASA Facilities Management Division (FMD) during the implantation phase.
6. The vendor shall submit a Safety Plan for review and approval. The plan shall:

a. Comply with NPR8715.3C- Chapter 9- Safety and Risk Management for NASA Contracts (Appendix D and Appendix E)
b. Include an activity hazard analysis document, which describes the likely unique hazards to be encountered and the methods mitigate the hazards and obtain safety objectives. The vendor is informed that the Beltsville Agricultural Research Center has a former site under investigation for PCE contamination at a former air field 0.5 miles to the northeast, near the proposed construction. There is a very small potential that the PCE in the shallow soil/groundwater may affect this project. The contractor installing the well shall include in the safety plan procedures for addressing the potential for PCE in the soils cuttings taken from below the groundwater table. See example in Appendix F
c. Meet the minimum requirement shown in Appendix G -Safety Plan Checklist.

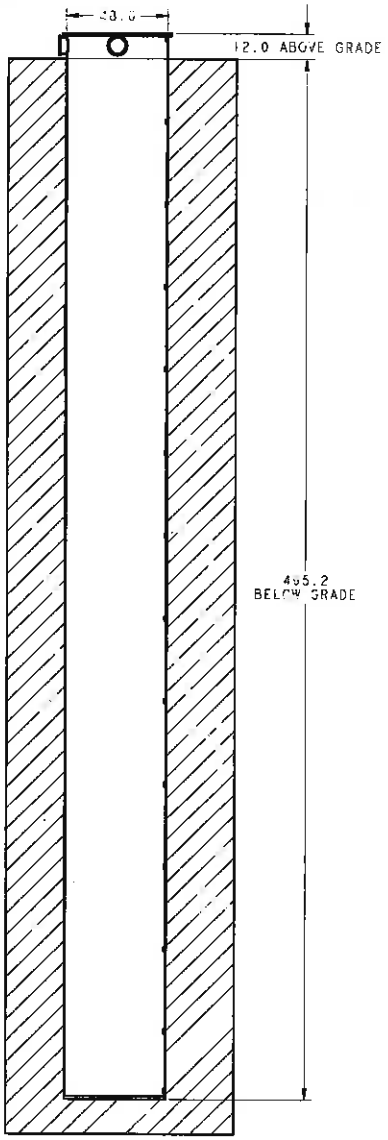
7. The vendor shall submit a GSFC Mobile Crane Lift Plan for review and approval, utilizing the GSFC form provided. See Appendix H.

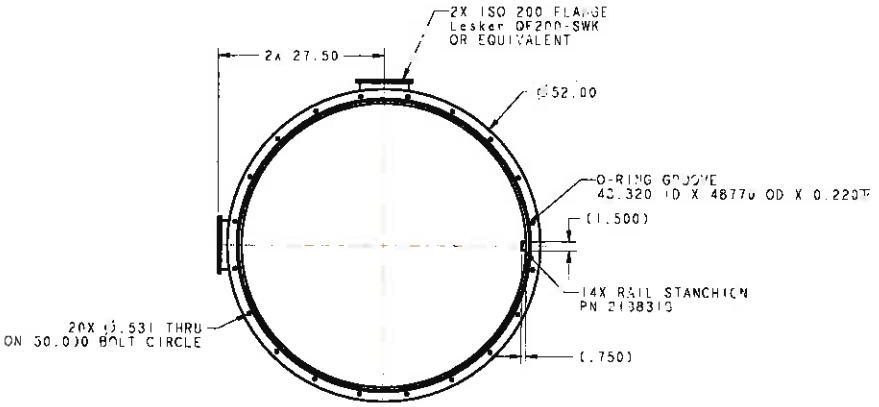
Appendix A: Site Layout (*VVP_site_GGAO.pdf)*
Appendix B: Vacuum Pipe drawing (*2188320.pdf)*
Appendix C: Geotechnical Engineering Report (*VVP_Geotechnical_Report.pdf)*
Appendix D: NPR 8715.3C- Chapter9- Safety and Risk Management for NASA Contracts (*NPR8715.3c_Chapter_9.pdf*)
Appendix E: NPR 8715.3C- Appendix E- Sample Safety and Health Plan for Service or Operations Contracts (*NPR8715.3c_Sample Safety and Health Plan.pdf*)
Appendix F: Hazard analysis example (Hazard_analysis_example.pdf)
Appendix G: Safety Plan Checklist (*Safety_Plan_Checklist.pdf*)
Appendix H: GSFC Mobile Crane Lift Plan template (*gsfc_mobile_crane_lift_plan.docx*)

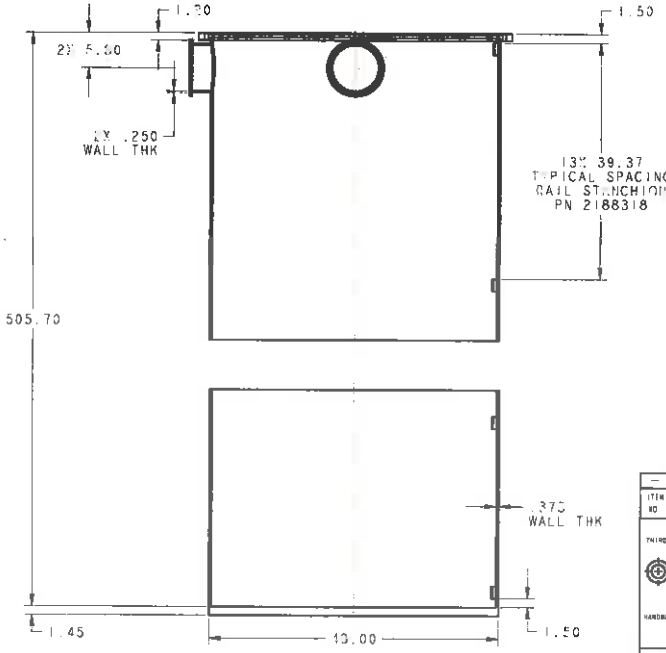

Facility located at NASA Goddard Geophysical and Astronomical Observatory (GGAO)
Existing 600 m beam line
Existing structures
Access road packed dirt and gravel
Pipe installation location 39.02091, -76.81942

NOTES: UNLESS OTHERWISE SPECIFIED

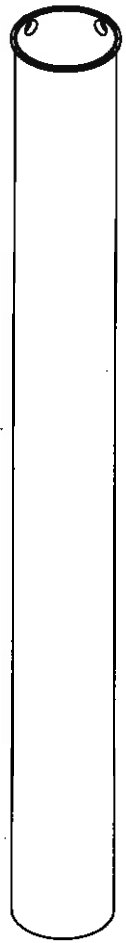
1. NOTE
2. FLAGNOTE




BROKEN VIEW
SCALE 1/10



| ITEM NO | REQD | REQ'D | PART NO. | DESCRIPTION | MATERIAL | MAT'L SPEC OR CAGE CODE |
|---|---|---|---|---|---|---|
| — | | X | 2188320 | VERTICAL VACUUM PIPE, WELDMENT | 301 SS | |

LIST OF MATERIAL

THIRD ANGLE PROJECTION — INCH / HYBRID METRIC/INCH / METRIC

HARDWARE CLASSIFICATION

TOLERANCES FOR INCH:

TOLERANCES FOR METRIC:

SOFTWARE: Pro/ENGINEER
FILE LOCATION:
DRAWING FILE: 2188320 REV 0
MODEL FILE: 2188320.PRT.0

NEXT ASSY | USED ON

National Aeronautics and Space Administration — Goddard Space Flight Center

| NAME | UNIT | DATE |
|---|---|---|
| DRAWN: D. McClelland | | |
| CHECKED | | |
| APPROVED | | |
| APPROVED | | |
| APPROVED | | |

TITLE: VERTICAL VACUUM PIPE, WELDMENT, NCSD

DRAWING INTERPRETED PER SGHPG-8100.2.5

SIZE: D | CAGE CODE: 36FC1 | DWG NO: 2188320 | REV

SCALE: 1/200 | SHEET 1 OF 1

GSFC 4-48 (8/8)

2188320

February 3, 2014

# Geotechnical Engineering Report

# Goddard Geophysical and Astronomical Observatory
# NASA Goddard Space Flight Center
# Springfield Road
# Greenbelt, Maryland


GeoConcepts Engineering, Inc.

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Ashburn, VA 20147
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GeoConcepts Engineering, Inc.

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February 3, 2014

Mr. Ryan McClelland
NASA Goddard Space Flight Center
Code 662 Bldg. 22 Room C193
Greenbelt, Maryland 20771

**Subject:** **Geotechnical Engineering Report, Goddard Geophysical and Astronomical Observatory, NASA Goddard Space Flight Center, Springfield Road, Greenbelt, Maryland (Our 13300.02)**

Dear Mr. McClelland:

GeoConcepts Engineering, Inc. (GeoConcepts) is pleased to present the following geotechnical engineering report prepared for Goddard Geophysical and Astronomical Observatory, NASA Goddard Space Flight Center, Springfield Road, Greenbelt, Maryland 20769. This report has been completed in accordance with the terms and conditions of our contract dated October 28, 2013.

# 1.0 Scope of Services

This geotechnical engineering report presents the results of the field investigation, soil laboratory testing, and engineering analysis of the geotechnical data. This report specifically addresses the following:

- A summary of the subsurface conditions disclosed by the soil test boring. This service includes preparation of a soil test boring log and a well diagram.
- Foundation recommendations for support of the proposed vertical vacuum chamber.
- Recommendations on buoyance impacts of groundwater on the planned vacuum chamber.
- Construction considerations for the installation of a straight shaft drilled pier to be used to create the hole for the vacuum chamber to be installed.

Services not specifically identified in the contract for this project are not included in the scope of services.

# 2.0 Subsurface Conditions

Subsurface conditions were investigated by drilling one test boring to a depth of 50 feet in the proposed site development area. The test boring log and well diagram is presented in Appendix A of this report. According to local geologic maps, the site is mapped in the Potomac Group of the Cretaceous geologic time period. Specifically the site is underlain by the Russett-Christiana complex, 0 to 2 percent slopes (RcA). Classification of soils were performed by visual inspection in accordance with the Unified Soil Classification System.

Groundwater level observations were made during drilling and obtained approximately two weeks after drilling was completed via the converted boring to temporary groundwater observation well. Groundwater was encountered at a depth of about 20.5 feet below the existing ground surface, or about EL 124.5. The groundwater observations presented herein are considered to be an indication of the groundwater levels at the dates and times indicated. Accordingly, the groundwater information presented herein should be used with caution. Also, fluctuations in groundwater levels should be expected with seasons of the year, construction activity, changes to surface grades, precipitation, or other similar factors.

# 3.0 Engineering Analysis

Recommendations regarding foundations, hydrostatic pressure, and shaft construction considerations are presented herein.

## 3.1 Chamber Foundation

Details regarding the vacuum chamber configuration were not available at this writing. We have assumed the vacuum chamber will be comprised of a cylindrical chamber, and that it will not be heavily loaded. While we have provided a recommended footing bearing pressure, we have assumed that due to ground water uplift pressures, the design of a system to resist uplift pressure from the water table will be required. Details regarding the uplift pressure are provided herein.

Based on the finished chamber elevation for the proposed vertical vacuum chamber, generally firm natural soils should be encountered at the normal footing depth. Footings founded in these materials are considered suitable for support of the proposed development, and may be designed with a net allowable soil bearing pressure of 4,000 psf. It is critical that all footing subgrades be observed and approved for the appropriate bearing pressure by the geotechnical engineer, prior to placement of steel reinforcement or concrete.

Settlement of spread footings should not exceed about 1-inch. However, it is expected that if settlement occurs, it will occur relatively quickly. Footing subgrades should be observed and approved prior to placement of concrete, to ascertain that footings are placed on suitable bearing soils as recommended herein. Footings should be excavated and concrete placed the same day in order to avoid disturbance from water or weather. Disturbance of footing subgrades by exposure to water seepage or weather conditions should be avoided. Any existing fill, disturbed, frozen, or soft subgrade soils should be removed prior to placing footing concrete. It may be desirable to place a 3 to 4-inch thick "mud mat" of lean concrete immediately on the approved footing subgrade to avoid softening of the exposed subgrade. Forms may be used if necessary, but less subgrade disturbance is anticipated if excavations are made to the required dimensions and concrete placed against the soil. If footings are formed, the forms should be removed and the excavation backfilled as soon as possible. Water should not be allowed to pond along the outside of footings for long periods of time.

## 3.2 Hydrostatic Pressures

Based on the observed groundwater depth of about 20 feet below grades, or EL 124.5 we have assumed a design groundwater level of 15 feet below the existing ground surface or about EL 130, to account for seasonal fluctuations in the groundwater table. Assuming the vacuum chamber extends 40 feet below grade, a groundwater head pressure of approximately 25 feet will apply. Therefore, a hydrostatic pressure of 1,560 psf will apply. Please note that the groundwater monitoring well has been left in place so groundwater measurements can be made periodically. These measurements should be made on a monthly basis and documented so that variations in groundwater levels can be documented. For design purposes, we recommend the uplift resistance design be based on a groundwater level at least 5 feet higher than any actual measured level so that significant changes in groundwater levels do not negatively impact the chamber performance.

For design purposes, we recommend disregarding the weight of the vacuum chamber or the weight of any equipment in the chamber. Assuming the chamber is water tight, it will have to be designed to resist the uplift pressure from groundwater. We recommend the uplift pressure be resisted by either providing a foundation system to resist the uplift or by installing a ballast slab.

A foundation system to resist the uplift pressure may consist of helical piers, or other similar pile foundation systems that can be used to resist the uplift pressure from the groundwater. Helical piles are installed by specialty contractors that determine the number, size, and spacing of the helixes required for the load to be achieved and provide guarantees relative to the capacities of the piers. The helical pier specialty

contractor should be required to furnish piles of the required capacity with a factor of safety of 2.0. Helical foundations should have a minimum side clearance of 3 times the largest helix diameter. Installation of helical piers should be monitored by a professional geotechnical engineer on a full-time basis to document that the design pile capacities are achieved. Because this is a relatively unique system we recommend it be completed as a design/build effort by a contractor who has experience in pile foundation systems, and can provide the structural design of the transfer of loading from the chamber to the foundation system used. Specific details of the design our beyond the scope of services of this contract.

As an alternative to using a foundation system, a ballast slab can be designed to resist the uplift pressure from groundwater. The ballast slab will have to be designed with adequate weight to resists the uplift pressure. In addition, the ballast slab will have to be connected to the vacuum chamber in a way to withstand the uplift pressure. Please note that if the design of the ballast slab goes below the current planned depth of 40 feet for the bottom of the chamber, additional uplift pressure at a rate of 62.4 psf per foot of additional ballast slab depth should be added to the uplift pressure recommendation presented herein.

## 3.3 Drilled Shaft Construction

Based on the configuration of the planned vacuum chamber, it is expected that the installation of the chamber will be accomplished by auguring the hole for the chamber using drilled shaft construction techniques. Accordingly, we have provided recommendations for the construction considerations for this process. Please note these recommendations may require modification based on specific construction methods used.

Based on the groundwater data, we recommend that the contractor be prepared to provide temporary dewatering during construction. To help maintain bottom stability of excavations, groundwater levels should be drawn-down a minimum of 3 feet below the lowest portion of the excavation. Groundwater levels should be maintained at least 3 feet below the deepest excavation during the drilled pier excavation operations, and until the vacuum chamber is installed and uplift resistance measures are in place and functioning.

During excavation of the shaft for the vacuum chamber steel casing should be used to avoid sloughing or collapse of the sidewalls, and to limit water intrusion. After excavation to the planned maximum depth, the bottom of the excavation should be cleaned of loose soil so the subgrade consists of natural undisturbed soils. A representative of this firm should make observations of the subgrade bottom to verify it is suitable for the design bearing pressure, and free of disturbed or excessively soft materials.

It is noted that the existing laser is located in close proximity to the planned vacuum chamber. During the drilled shaft construction, the support for the existing laser structure must be maintained and not be disturbed. Depending on the existing foundation support for the laser, this may require lowering or reestablishing the existing support for the laser.

# 4.0 General Limitations

This report does not reflect conditions that may occur between the points investigated, or between sampling intervals in test borings. The nature and extent of variations between test borings and sampling intervals may not become evident until the course of construction. Therefore, it is essential that on-site observations of subgrade conditions be performed during the construction period to determine if re-evaluation of the recommendations in this report must be made. It is critical to the successful completion of this project that GeoConcepts be retained during construction to observe the implementation of the recommendations provided herein.

This report has been prepared to aid in the evaluation of the site and to assist your office and the design professionals in the design of this project. It is intended for use with regard to the specific project as

described herein. Changes in proposed construction, grading plans, structural loads, etc. should be brought to our attention so that we may determine any effect on the recommendations presented herein.

An allowance should be established for additional costs that may be required for foundation and earthwork construction as recommended in this report. Additional costs may be incurred for various reasons including soft subgrade conditions, unexpected groundwater problems, etc.

This report should be made available to bidders prior to submitting their proposals to supply them with facts relative to the subsurface conditions revealed by our investigation and the results of analyses and studies that have been performed for this project. In addition, this report should be given to the successful contractor and subcontractors for their information only.

We recommend the project specifications contain the following statement: "A geotechnical engineering report has been prepared for this project by GeoConcepts Engineering, Inc. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the geotechnical engineer and represent their interpretation of the subsoil conditions, tests and results of analyses that they performed. Should the data contained in this report not be adequate for the contractor's purposes, the contractor may make their own investigations, tests and analyses prior to bidding."

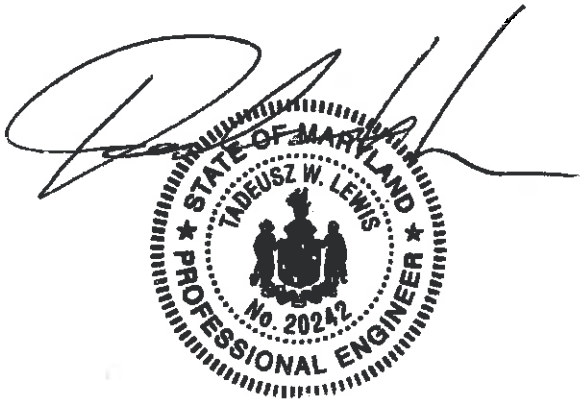
This report was prepared in accordance with generally accepted geotechnical engineering practices. No warranties, expressed or implied, are made as to the professional services included in this report.

We appreciate the opportunity to be of service for this project. Please contact the undersigned if you require clarification of any aspect of this report.

Sincerely,

**GEOCONCEPTS ENGINEERING, INC.**

Josh April
Senior Staff Geologist




Tadeusz W. Lewis, PE
Principal

Appendix A:

1) Boring Log and Well Diagram
2) Subsurface Investigation Procedures
3) Soil Identification
4) Soil boring Notes

JA/TWL/shm
N:\PROJECTS\Active 13 Projects\13300.02, Vacuum Chamber\Final\Geotechnical Report.docx

**GeoConcepts Engineering, Inc.**

19955 Highland Vista Drive, #170
Ashburn, Virginia 20147

703-726-8030
703-726-8032 fax

| | | |
|---|---|---|
| PROJECT: **NASA Goddard Space Flight Center** | LOGGED BY: **J. April** | BORING NUMBER: **B-1** |
| LOCATION: **Geophysical & Astronomical Observatory** | DRILLING CONTRACTOR: **Connelly and Associates, Inc.** | SHEET 1 OF 1 |
| OWNER/CLIENT: **NASA Goddard Space Flight Center** | DRILLER: **J. Leatherman** | DATE STARTED: **1/8/14** |
| PROJECT NUMBER: **13300.02** / GROUND SURFACE ELEVATION (ft): **145.0 ±** | DRILLING METHOD: **3.25" I.D. HSA** | DATE COMPLETED: **1/8/14** |

| ELEV. (ft) | DEPTH (ft) | STRATUM | MATERIAL DESCRIPTION | MC (%) | WELL CONSTRUCTION | SAMPLE TYPE | SPT BLOW COUNTS | RECOVERY (in) |
|---|---|---|---|---|---|---|---|---|
| 144.5 | | | Topsoil = 6 inches | | 3.0 FT. ABOVE GROUND SURFACE | | | |
| | | B1 | FAT CLAY (CH), moist, reddish brown | | Grout | ☒ | 3+7+9+12 | |
| 136.5 | | | | | BENTONITE CLAY | | | |
| | 10 | | clayey SAND (SC), moist, tan and gray | | | ☒ | 6+10+10 | 18 |
| 131.5 | | | POORLY GRADED SAND (SP-SM) with silt, moist, reddish brown, brown, and tan | | | ☒ | 5+9+13 | 10 |
| | 20 | | | | | ☒ | 3+14+30 | 12 |
| | | | wet below 23.5 ft. | | | ☒ | 2+5+10 | 5 |
| | 30 | B2 | | | 1-INCH SLOTTED SCREEEN W/ PEA GRAVEL FILTER PACK | ☒ | 21+39+50/5 | 17 |
| | | | | | | ☒ | 6+22+35 | 18 |
| | 40 | | | | | ☒ | 5+7+11 | 18 |
| | | | | | | ☒ | 5+8+10 | 18 |
| 95.0 | 50 | | Bottom of Boring at 50.0 ft | | | ☒ | 4+7+8 | 18 |

STANDARD PENETRATION TEST RESISTANCE (BLOWS/FOOT): 20 40 60 80

GROUND WATER LEVELS:

- ▽ ENCOUNTERED: 23.5 ft ELEV. 121.5
- ▼ UPON COMPLETION: 20.0 ft ELEV. 125.0
- ▼ 2/24/2014 20.7 ft ELEV. 124.4

SAMPLE TYPES:

☒ Split Spoon

REMARKS:

THE STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARIES. THE TRANSITION MAY BE GRADUAL.

BOREHOLE/TEST PIT LOGS.GPJ GEOCONCEPTS.GDT 2/3/14

GeoConcepts Engineering, Inc.

# Subsurface Investigation Procedures

**1. Test Borings – Hollow Stem Augers**

The borings are advanced by turning an auger with a center opening of 2-¼ or 3-¼ inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger, by standard methods, after removal of the plug. Usually, no water is introduced into the boring using this procedure.

**2. Standard Penetration Tests**

Standard penetration tests are performed by driving a 2 inch O.D., 1-⅜ inch I.D. sampling spoon with a 140-pound hammer falling 30 inches, according to ASTM D-1586. After an initial 6 inches penetration to assure the sampling spoon is in undisturbed material, the number of blows required to drive the sampler an additional 12 inches is generally taken as the N value. In the event 30 or more blows are required to drive the sampling spoon the initial 6 inch interval, the sampling spoon is driven to a total penetration resistance of 100 blows or 18 inches, whichever occurs first. The sampling operation is terminated after a total of 100 hammer blows and the depth of penetration is recorded.

**3. Groundwater Observation Wells**

A water observation well was installed in test boring B-1. The well was installed by inserting a 1-1/4 inch plastic perforated pipe through the 3-¼ inch center opening of the auger and backfilling with sand filter material as the auger was withdrawn. The pipe was capped for protection from rainfall, runoff, and foreign objects. Readings were taken as shown on the test boring logs.

**4. Test Boring**

The test boring stakeout was provided by GeoConcepts personnel using available site plans. Ground surface elevations were estimated from topographic information contained on the site plan provided to us and should be considered approximate. If the risk related to using approximate boring locations and elevations is unacceptable, we recommend an as-drilled survey of boring locations and elevations be completed by a licensed surveyor.

GeoConcepts Engineering, Inc.

# Identification of Soil

## I. DEFINITION OF SOIL GROUP NAMES

| | | ASTM D-2487 | Symbol | Group Name |
|---|---|---|---|---|
| Coarse-Grained Soils More than 50% retained on No. 200 sieve | **Gravels** More than 50% of coarse fraction retained on No. 4 sieve | Clean Gravels Less than 5% fines | ***GW*** | WELL GRADED GRAVEL |
| | | | ***GP*** | POORLY GRADED GRAVEL |
| | | Gravels with Fines More than 12% fines | ***GM*** | silty GRAVEL |
| | | | ***GC*** | clayey GRAVEL |
| | **Sands** 50% or more of coarse fraction passes No. 4 sieve | Clean Sands Less than 5% fines | ***SW*** | WELL GRADED SAND |
| | | | ***SP*** | POORLY GRADED SAND |
| | | Sands with fines More than 12% fines | ***SM*** | silty SAND |
| | | | ***SC*** | clayey SAND |
| Fine-Grained Soils 50% or more passes the No. 200 sieve | **Silts and Clays** Liquid Limit less than 50 | Inorganic | ***CL*** | LEAN CLAY |
| | | | ***ML*** | SILT |
| | | Organic | ***OL*** | ORGANIC CLAY |
| | | | | ORGANIC SILT |
| | **Silts and Clays** Liquid Limit 50 or more | Inorganic | ***CH*** | FAT CLAY |
| | | | ***MH*** | ELASTIC SILT |
| | | Organic | ***OH*** | ORGANIC CLAY |
| | | | | ORGANIC SILT |
| Highly Organic Soils | Primarily organic matter, dark in color, and organic odor | | ***PT*** | PEAT |

## II. DEFINITION OF MINOR COMPONENT PROPORTIONS

| Minor Component | Approximate Percentage of Fraction by Weight |
|---|---|
| Gravelly, Sandy (adjective) | 30% or more coarse grained |
| Sand, Gravel (with) | 15% to 29% coarse grained |
| Silt, Clay (with) | 5% to 12% fine grained |

## III. GLOSSARY OF MISCELLANEOUS TERMS

| | |
|---|---|
| SYMBOLS | Unified Soil Classification Symbols are shown above as group symbols. Use "A" Line Chart for laboratory identification. Dual symbols are used for borderline classification. |
| BOULDERS & COBBLES | Boulders are considered pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inches. |
| DISINTEGRATED ROCK | Residual rock material with a standard penetration test (SPT) resistance between 60 blows per foot and refusal. |
| ROCK | Rock material with a standard penetration test (SPT) resistance of 100 blows for 2 inches or 50 blows for 0 inches, or less penetration |
| DECOMPOSED ROCK | Residual rock material exhibiting rock-like properties that can be excavated by backhoe equipment. Similar to Disintegrated Rock, but cannot be classified as such because SPT N-Values were not obtained. |
| ROCK FRAGMENTS | Angular pieces of rock, distinguished from rounded transported gravel, which have separated from original vein or strata and are present in a soil matrix. |
| QUARTZ | A hard silicate mineral often found in residual soils. Only used when describing residual soils. |
| CEMENTED SAND | Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate, iron oxide, or other minerals. Commonly encountered in Coastal Plain sediments, primarily in the Potomac Group sands (Kps). |
| MICA | A plate-like phyllosilicate mineral found in many rocks, and in residual or transported soil derived there from. |
| ORGANIC MATERIALS | Topsoil - Surface soils that support plant life and contain organic matter. |
| (Excluding Peat) | Lignite - Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal). |
| FILL | Manmade deposit containing soil, rock, and other foreign matter. |
| PROBABLE FILL | Soils which contain no visually detected foreign matter but which are suspect with regard to origin. |
| LAYERS | ½ to 12 inch seam of minor soil component. |
| COLOR | Two most predominant colors present should be described. |
| MOISTURE CONDITIONS | Wet, moist, or dry to indicate visual appearance of specimen. |

GeoConcepts Engineering, Inc.

# Test Boring Notes

1. Classification of soil is by visual inspection and is in accordance with the Unified Soil Classification System.

2. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of soil, site topography, etc.

3. Sampling data presents standard penetrations for 6-inch intervals or as indicated with graphic representations adjacent to the sampling data.

4. The logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the test locations. Also, the passage of time may result in a change in the subsurface conditions at the test locations.

5. The stratification lines represent the approximate boundary between soil types as determined in the sampling operation. Some variation may be expected vertically between samples taken. The soil profile, groundwater level observations and penetration resistances presented on the logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.

**NASA Procedural Requirements**

**NPR 8715.3C**
Effective Date: March 12, 2008
Expiration Date: December 12, 2014

**COMPLIANCE IS MANDATORY**

Printable Format (PDF)

Request Notification of Change (NASA Only)

**Subject: NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)**

**Responsible Office: Office of Safety and Mission Assurance**

| TOC | ChangeLog | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | Chapter7 | Chapter8 | Chapter9 | Chapter10-Reserved | Chapter11 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | AppendixG | AppendixH | AppendixI | ALL |

# Chapter 9. Safety and Risk Management for NASA Contracts

## 9.1 Purpose

This chapter provides the procedural requirements for assuring that NASA contractors have effective safety and risk management programs. This chapter provides requirements for NASA officials with responsibility for assuring safety under NASA contracts.

## 9.2 Applicability and Scope

9.2.1 When NASA activities include contractor involvement, Center Directors and project managers shall include contractors in the NASA Safety Program (Requirement 25054).

9.2.2 Center SMA Directors, project managers, COs, and COTRs shall ensure that NASA contracts are written to hold contractors accountable for the safety of their employees, their services, their products, and for complying with NASA and Center safety requirements (Requirement 31915).

## 9.3 Authority and Responsibility

9.3.1 Project managers shall:

a. Work with cognizant safety officials to develop and approve safety requirements and objectives for efforts to be contracted, and advise COs and COTRS of specific safety concerns or issues related to contract performance (Requirement 31917).

b. Ensure that the application of the requirements in Chapter 2 of this NPR are specified in related contracts, memoranda of understanding, and other documents for joint ventures between NASA and

other parties including commercial services, interagency efforts, and international partnerships (Requirement 32103).

c. Ensure that NASA responsibilities are specified in contracts, memoranda of understanding, and other documents for joint ventures between NASA and other parties including commercial services, interagency efforts, and international partnerships (Requirement).

d. Ensure that contracts contain safety, mission success, and risk management requirements for design, development, fabrication, test, and the operations of systems, equipment, and facilities in consultation with Center SMA Directors (Requirement 25060).

e. Use the software safety requirements in NASA-STD-8719.13, Software Safety Standard, and NASA-STD-8739.8, Software Assurance Standard, as the basis for contracts, memoranda of understanding, and other documents related to software (Requirement).

f. Provide specific safety tasks to the CO for incorporation into contracts (Requirement 31919).

g. Define the surveillance of contractor safety matters with respect to the nature of the procurement (Requirement 31920).

h. Ensure that performance-based contracts have a surveillance plan (Requirement 31921).

9.3.2 System Safety Managers, COs, and COTRs shall:

a. Develop safety requirements and objectives that are clearly delineated in contract specifications in conjunction with project officials (Requirement 31918).

b. Establish safety performance as an element to be evaluated in contracts with fee plans (Requirement 31924).

c. Require copies of MSDS for new hazardous materials as requested by the local NASA safety office (Requirement 31925).

d. Participate in onsite visits and pre-bid conferences to ensure potential bidders understand safety provisions (Requirement 31927).

e. Review, comment, and approve (or disapprove) the contractors' safety risk assessment, submitted in response to paragraph 9.3.3, before the start of any hazardous deliverable work or support operations (Requirement).

f. Coordinate any matter regarding proposed requests for relief to safety requirements of 48 CFR Part 1823.70, Safety and Health, with the OSMA or designated representative (Requirement 31923).

g. Implement NPR 5100.4, Federal Acquisition Regulation Supplement (NASA FAR Supplement) (Requirement 25058).

h. Implement 48 CFR Parts 1807, Acquisition Planning; 1823, Environment, Energy and Water Efficiency, Renewable Energy Technologies, Occupational Safety, and Drug-Free Workplace; 1842, Contract Administration and Audit Services; and 1846, Quality Assurance (Requirement).

9.3.3 COs or the COTR shall ensure the contractors' safety risk assessments are developed and provided to NASA for approval before the start of any hazardous deliverable work or support operations (Requirement).

9.3.4 System Safety Managers shall:

a. Assist the CO and COTR in evaluating the prospective contractor's safety record and safety program (Requirement 32095).

b. Assist the CO and COTR in applying any special safety provisions to grants or cooperative agreements (see paragraph 2.7) (Requirement 32096).

c. During the pre-award phase of acquisition, develop, document and provide to the CO criteria for the safety performance elements to be evaluated in contracts with fee plans in a timely manner to ensure inclusion in the solicitation (Requirement).

## 9.4 Requirements

9.4.1 COs and COTRs shall:

a. Ensure contract solicitations require the submission of safety and risk management documentation (e.g., corporate safety policies, implementation procedures, safety performance experience, Experience Modification Rates, Worker Compensation Claims, and mishap rates by North American Industrial Classification System (NAICS) codes, and draft program planning documents, such as safety and health plans and risk management plans) as provided by the Center's SMA Organization (Requirement 25061). (See Appendix E and Appendix F for more information to ensure that solicitation instructions include the requirements outlined in both Appendices.)

b. . Ensure contract solicitations include the evaluation of safety and risk management documentation (e.g., corporate safety policies, implementation procedures, safety performance experience, Experience Modification Rates, Worker Compensation Claims, and mishap rates by NAICS codes) and draft program planning documents, such as safety and health plans and risk management plans as a factor for evaluating bids (Requirement). (See Appendix E and Appendix F for more information.)

c. Ensure that safety and risk management evaluation criteria and solicitation instructions are developed in conjunction with responsible project personnel and Center SMA organization representatives (Requirement). (See Appendix E and Appendix F for more information.)

9.4.2 Center SMA Directors shall:

a. Brief all onsite contractors on local safety requirements to include incident and accident reporting, emergency evacuation procedures, fire reporting, medical emergency notification and response actions, hazardous material spill reporting and response, site entry/exit procedures, and hot work permit requirements before contract performance begins and at least annually, thereafter (Requirement 25062).

b. Document the onsite contractors briefings (Requirement 32097).

c. Inform the onsite contractor of any adjacent NASA and any other contractor operations that could pose a hazard to their operation and employees (Requirement).

d. Assist the program or project manager or other responsible official in implementing contractor safety surveillance and evaluation programs (Requirement 25066).

e. During the pre-award phase of acquisition; develop, document and provide to the CO safety, mission success and risk management requirements for design, development, fabrication, test, and the operations of systems, equipment, and facilities in a timely manner to ensure inclusion in the solicitation (Requirement).

f. During pre-award phase of acquisition; develop, document and provide to the CO, a statement of work elements, evaluation criteria, and solicitation instructions requiring the submittal of safety and risk management documentation (e.g., corporate safety policies, implementation procedures, safety performance experience, and mishap rates by North American Industrial Classification System (NAICS) codes, and draft program planning documents, such as safety and health plans and risk management plans) in a timely manner to ensure inclusion in the solicitation (Requirement).

g. Participate in the contractor selection and evaluation process providing support to the CO to ensure the proper evaluation of contractor proposal information (e.g., corporate safety policies, implementation procedures, safety performance experience, and mishap rates by NAICS codes) and draft program planning documents, such as safety and health plans and risk management plans, as a factor for evaluating bids (Requirement).

9.4.3 Center SMA Directors, COs, and COTRs shall ensure that contracts include a provision to require the contractor to provide a written plan for mitigating risks from hazardous operations to adjacent and other contractors (Requirement 32098). (See Appendix E and Appendix F for more information.)

## 9.5 Access to NASA Facilities by State and Federal Compliance Safety and Health Officers

9.5.1 Unless exclusive Federal jurisdiction is claimed by Federal OSHA, Center Directors and project managers shall allow both Federal and State OSHA compliance safety and health officers and investigators to review and survey contractor operations and investigate contractor mishaps at NASA Centers.

> *Note: If the State does not have a Department of Labor-approved safety plan or the Center is under exclusive Federal jurisdiction, only Federal compliance officers shall have the right of access to NASA or contractor operations. Further access requirements for OSHA and National Institute of Occupational Safety and Health are provided in NPR 8715.1, NASA Occupational Safety and Health Programs.*

9.5.2 Center Directors and project managers shall:

a. Notify the OSMA, the OCHMO, Occupational Health Division, and the Designated Agency Safety and Health Official (DASHO) of any OSHA (Federal or State) impending investigations (Requirement).

b. Provide the results of Federal and State OSHA investigations to the OSMA, Safety Assurance and Requirements Division, the OCHMO, and the DASHO (Requirement 32100).

## 9.6 Contractor Citations

9.6.1 Center Directors and project managers shall ensure contractor organizations are accountable for providing their employees with safe working conditions regardless of where the employees are working (Requirement 25072).

> *Note: This provision is required by 5 U.S.C. S 7902; 29 U.S.C. S 651 et seq.; 49 U.S.C. S 1421, the Occupational Safety and Health Act of 1970, as amended, and therefore, it is the contractor's responsibility to submit a timely reply to any OSHA citation it receives. The contractor is responsible for settling citations issued against its operation unless specifically addressed in the contract.*

## 9.7 Grants

9.7.1 Project managers that select research projects that could contain possible safety issues shall:

a. Identify the need for special safety conditions to be included in grants or cooperative agreement award documents (Requirement 25073).

> *Note: A "special safety condition" addressing safety should be included in grants and cooperative agreements when contract performance involves NASA facilities, Government-Furnished Equipment, or hazardous or energetic materials or chemicals that may pose a significant safety or health risk to the public, NASA employees, and contractor employees when used.*

b. Identify special safety conditions that include provisions for applicable OSHA requirements and host institution and general industry-accepted practices to be followed during research to eliminate or control risks associated with implementing the grant or cooperative agreement (Requirement 32101).

| TOC | ChangeLog | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | Chapter7 | Chapter8 | Chapter9 | Chapter10-Reserved | Chapter11 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | AppendixG | AppendixH | AppendixI | ALL |

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# NASA Procedural Requirements

**COMPLIANCE IS MANDATORY**

**NPR 8715.3C**
Effective Date: March 12, 2008
Expiration Date: March 12, 2014

Printable Format (PDF)

Request Notification of Change (NASA Only)

## Subject: NASA General Safety Program Requirements (w/Change 9 dated 2/08/13)

**Responsible Office: Office of Safety and Mission Assurance**

| TOC | ChangeLog | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | Chapter7 | Chapter8 | Chapter9 | Chapter10-Reserved | Chapter11 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | AppendixG | AppendixH | AppendixI | ALL |

# Appendix E. Sample Safety and Health Plan for Service or Operations Contracts

A detailed Safety and Health Plan is submitted as part of a Service or Operations contract proposal, showing how the contractor intends to protect the life, health, and well-being of the public, and NASA and contractor employees as well as property and equipment. The plan should include detailed discussions of the policies, procedures, and techniques for all anticipated working conditions that will be encountered throughout the performance of the contract. The safety and health of subcontractor employees should be included in the plan for any proposed subcontract whose value is expected to exceed $1,000,000 including commercial services and services provided in support of a commercial item. An approved Safety and Health Plan will be included as a part of any resulting contract.

If the contractor will conduct work or be located on a NASA site or in a NASA facility, the Safety and Health Plan should discuss measures to be taken to ensure the protection of property, equipment, and the environment in the production of contractor deliverables and/or in the pursuit of any of its activities. An approved onsite contractor will develop and subsequently implement a Safety and Health Program based on the approved plan that will includes policies and procedures for compliance with pertinent NASA policies and requirements, and Federal, State and local regulations for safety, health, environmental protection, and fire protection. The contractor's Safety and Health Program will be used to assure integration of the onsite contractor as a full participant in the Center's Safety and Health Program.

The proposed Safety and Health Plan should contain the information.

CONTENTS OF THE PROPOSED SAFETY AND HEALTH PLAN

1.0 MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION.

1.1 Policy. Provide the contractor's corporate safety policy statement. Compare this policy statement with those of NASA and OSHA and discuss any differences.

1.2 Goals and Objectives. Describe specific goals and objectives of the Safety and Health Plan. Discuss these goals and objectives using the framework of the elements of a safety and health management system described by the OSHA VPP (management leadership and employee involvement; worksite analysis; hazard prevention and control; and safety and health training). Describe the approach (including milestone schedule) to achieve and maintain safety and health management practices according to the criteria outlined in four elements of the OSHA VPP safety and health management in all areas.

1.3 Management Leadership. Describe the process and procedures for implementing management commitments to safety and health through visible activities and initiatives including the exercise of controls to ensure workplace safety and health. Include a statement from the project manager or designated safety official indicating that the plan will be implemented as approved and that the project manager will take personal responsibility for its implementation.

1.4 Employee Involvement. Describe procedures to implement and promote employee (e.g., non-supervisory) involvement in safety and health program development, implementation, and decision making. Describe the scope and breadth of employee participation so that all safety and health risk areas are addressed.

1.5 Assignment of Responsibility. Describe the line and staff responsibilities for safety and health program implementation. Identify any other personnel or organizations that provide safety services or exercises any form of control or assurance in these areas. State the means of communication and interfaces concerning related issues used by line, staff, and others (such as documentation, concurrence requirements, committee structure, sharing of the work site with NASA and other contractors, or other special responsibilities and support). As a minimum, the contractor will identify the following:

a. Safety Representative. Identify, by title, the individual who will be responsible for the contractor's adherence to Center-wide safety, health, environmental, and fire protection concerns and goals, and will participate in meetings and other activities related to the Center's Safety and Health Program.

b. Company Physician. Provide the identification of a company physician to facilitate communication of medical data to the head of the NASA clinic. The contractor shall identify the point of contact by name, address, and telephone number to the NASA Center Clinic. Any changes that occur in the identity of the point of contact will be promptly conveyed to the NASA Center Clinic.

c. Building Fire Wardens. Each building occupied by the contractor will have an assigned individual to facilitate the Center's fire safety program. Duties will include coordination of fire-related issues with the NASA facility manager, and emergency planning and response officials and their representatives. Identify the assigned contractor Building Fire Warden.

d. Designated Safety Official. Identify, by title, the official(s) responsible for implementing the proposed Safety and Health Plan. Identify all formal contacts with regulatory agencies and with NASA.

1.6 Provision of Authority. Compare the provisions and procedures in the proposed Safety and Health Plan with applicable NASA requirements and contractual directions, and applicable Federal, State, and local regulations. Identify the lines of authority and responsibility for each requirement and regulation. Discuss how the subsequent contractor's Safety and Health Program will be controlled to maintain the identified lines of authority and responsibility for the life of the contract.

1.7 Accountability. Describe the procedures for ensuring that management and employees will be held accountable for implementing their tasks in a safe and healthful manner. The use of traditional and/or innovative personnel management methods (including discipline, motivational techniques, or any other technique that ensures accountability) should be referenced, as a minimum, and described, as appropriate.

1.8 Program Evaluation. Describe the method to be used for internal program reviews and

evaluations. The program review and evaluation may consist of either (1) participation in OSHA VPP surveys at the request of the Government or (2) described in a written report that documents the methods and procedures for determining the existence and criticality of the contractor's hazardous operations.

If the proposed plan provides for an internal reviews and evaluations other than participation in OSHA VPP surveys, the submitted report should include, but not be limited to, methods and procedures for the following: identification of the contractor's hazardous operations and products; approach to be used for conducting risk evaluations; the approach to be used for risk ranking with respect to consequence severity, risk management techniques to be applied to unacceptable safety risks, and the documentation of the results. The report should also include an identification of the personnel who will conduct the reviews and evaluations, to whom the reports will be made, and the frequency (at least annually) at which the reviews and evaluations will be performed. The reviews and evaluations should include subcontracted tasks. The submitted report should clearly describe the correlation between the proposed program review and evaluation approach and applicable criteria of the OSHA VPP.

When a written program review and evaluation is requested, it should be delivered to the Government no later than 30 days after the end of each contract year or at the end of the contract, whichever is applicable. Distribution of these program reviews and evaluations will be the same as that for the Safety and Health Plan. The OSHA VPP surveys will be scheduled and administered at the discretion of the Government.

1.9 The prospective contractor will describe the approach to be taken to document its safety and health program performance to provide necessary visibility and insight. This description should include: the identification, acquisition, and processing of safety and health data; development of procedures; recordkeeping; statistical analyses including metrics; and the furnishing of data and reports to the Government. Electronic access by the Government to this data is preferred as long as Privacy Act requirements are met and the Government safety and health professionals and their representatives have full and unimpeded access for review and audit purposes.

For contractor activities conducted on NASA property, the contractor will identify what records it will make available to the Government in accordance with the Voluntary Protection Program (VPP) criteria of OSHA as implemented in [the local Center's] Requirements Handbook for Safety, Health, and Environmental Protection, as revised. For the purpose of this plan, safety and health documentation includes, but is not limited to, logs, records, minutes, procedures, checklists, statistics, reports, analyses, notes, or other written or electronic document which contain in whole or in part any subject matter pertinent to safety, health, environmental protection, or emergency preparedness. The contractor will acknowledge the following as a standing request of the Government to be handled as described below.

a. Roster of Terminated Employees. NASA expects the contractor to identify and report terminated employees to the Center occupational health program office. This report should be sent to the Occupational Health Officer no later than 30 days after the end of each contract year or at the end of the contract, whichever is applicable. At the contractor's discretion, the report may be submitted for personnel changes during the previous year or cumulated for all years.

Information required:

(1) Date of report, contractor identity, and contract number.

(2) For each person listed: provide name, social security number, assigned Center badge number, and date of termination.

(3) Name, address, and telephone number of contractor representative to be contacted for questions or other information.

b. Material Safety Data. Describe the procedure to be used by the contractor to prepare and/or deliver to NASA, Material Safety Data for hazardous materials brought onto

Government property or included in products delivered to the Government. These data are required by the Occupational Safety and Health Administration (OSHA) regulation, 29 CFR Part 1910.1200, Hazard Communication, and Federal Standard 313 (or FED-STD-313), Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities, as revised. A single copy of each Material Safety Data Sheet (MSDS) will be sent upon receipt of the material for use on NASA property to the Center's Central Repository, Mail Code ____. Information on new or changed locations and/or quantities of hazardous materials normally stored or used onsite should also be sent to the Center's Central Repository. If the MSDS arrives with the material and is needed for immediate use, the MSDS should be delivered to the Central Repository by close of business of the next working day after it enters the site.

c. Hazardous Materials Inventory. The contractor will be responsible to compile and report the inventory of all hazardous materials within the scope of 29 CFR Part 1910.1200, Hazard Communication, and Federal Standard 313 (or FED-STD-313), Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities, as revised and its located on Government property. The call for this annual inventory will be issued by the [responsible NASA official], Mail Code ____. The inventor should contain the following information:

(1) The identity of the material.

(2) The location of the material onsite by building and room.

(3) The quantity of each material normally kept at each location.

1.10 Government Access to Safety and Health Program Documentation. The contractor shall recognize in its plan that it will be expected to make all safety and health documentation (including relevant personnel records) available for inspection or audit at the Government's request.

1.11 The contractor may be requested to participate in the review and modification of safety requirements that are to be implemented by the Government including any referenced documents therein. This review activity will be implemented at the direction of the NASA Contracting Officer's Technical Representative in accordance with established NASA directives and procedures.

1.13 Procurement. Identify procedures used to assure that the contractor's procurements are reviewed for safety considerations and that specifications contain appropriate safety criteria and instructions. Set forth authority and responsibility to assure that safety tasks are clearly stated in subcontracts.

2.0 WORKPLACE ANALYSIS. Describe the method and techniques the contractor will use to systematically identify the hazards within the workplace for the duration of the contract. The discussion should describe the information collection process including a combination of surveys, analyses, inspections of the workplace, investigations of mishaps and close calls, and the collection and trend analysis of safety and health data such as records of occupational injuries and illnesses; findings and observations from preventive maintenance activities; reports of spills and inadvertent releases to the environment; facilities-related incidents related to partial or full loss of systems functions; and employee reports of hazard. Every hazard identified by any of the techniques given below shall be ranked and processed in accordance with Center procedure. All hazards identified on NASA property that are immediately dangerous to life or health should be reported immediately to the NASA safety office and to the Contractor's President/Program Manager in order to ensure that proper attention and correction is given to these hazards. All safety engineering products, which address operations, equipment, and other aspects of safety engineering, on NASA property will be subject to the review and concurrence of the NASA Safety Office unless otherwise specified in the approved safety and health plan. The contractor is expected to have processes to address similar instances in contractor facilities utilizing contractor resources to manage such instances.

2.1 Hazard Identification. Describe the procedures and techniques to be used to compile an inventory of hazards associated with the work to be performed on this contract. This

inventory of hazards shall address the work specified in the contract as well as the hazards associated with operations and work environments in close proximity to contract operations. The hazard inventory results will be reported to the Government in a manner suitable for inclusion in facilities baseline documentation as a permanent record. Specific techniques to be considered include:

a. Comprehensive Survey. A "wall-to-wall" engineering assessment of the work site including facilities, equipment, processes, and materials (including waste).

b. Change Analysis. Address modifications in facilities, equipment, processes, and materials (including waste); and related procedures for operations and maintenance. Periodic change analyses will be driven by new or modified regulatory and NASA requirements.

c. Hazard Analysis. Address facilities, systems/subsystems, operations, processes, materials (including waste), and specific tasks or jobs.

2.2 Inspections. This paragraph should include the procedures and frequency for regular inspections and evaluations of work areas hazards and who will be accountable for implementing of corrective measures. The contractor will describe administrative requirements and procedures for the control of regularly scheduled inspections for fire and explosive hazards. The contractor has the option, in lieu of the above detail, to identify policies and procedures with the stipulation that the results (including findings) of inspections conducted on NASA property or involving Government furnished equipment will be documented in safety program evaluations or monthly Accident/Incident Summary reports. Inspections will identify the following:

a. Discrepancies between observed conditions and current requirements.

b. New (not previously identified) or modified hazards.

2.3 Employee Reports of Hazards. The contractor will identify the methods to be used to encourage employees to report hazardous conditions (e.g., close calls) and analyze/abate hazards. The contractor will describe steps to be taken to create reprisal-free employee reporting with emphasis on management support for employees and describe methods to be used to incorporate employee insights into hazard abatement activities.

3.0 MISHAP INVESTIGATION AND RECORD ANALYSIS.

3.1 Mishap Investigation and Reporting. The contractor will identify the methods to assure that the investigations and reporting of mishaps including corrective actions to be implemented to prevent recurrence. The contractor will describe the methods to be used to investigate and report on NASA property and on contractor or third party property. The contractor will describe procedures for implementing the NASA mishap investigation and reporting forms or use alternate contractor forms with emphasis on the timely notification of NASA. The contractor discussion should include: investigation procedures; exercise of jurisdiction over a mishap investigation involving NASA and other contractor personnel; follow up of corrective actions; communication of lessons learned to NASA; and solutions to minimize duplications in reporting and documentation including use of alternate forms or other solutions. The contractor will discuss its procedures for the immediate notification of fires, hazardous materials releases, and other emergencies. The contractor will include appropriate details to address the use of Incident Reporting Information System, including 24-hour and ten-day mishap reports to the Occupational Safety Office, mail code ___.

3.2 Trend Analysis. The contractor will describe the approach to be used to perform trend analysis of data (occupational injuries and illnesses; facilities, systems, and equipment performance; maintenance findings; etc.). The discussion should include methods to identify and abate common cause failures or occurrences indicated by the trend analysis. The contractor should discuss the following methods of providing data, in support of site-wide trend analysis to be performed by the Government. Further, the contractor should describe how the results of these trend analysis will be shared with employees so that they are aware of potential safety problems or hazards.

a. Accident/Incident Summary Report. The contractor will describe how monthly Accident/Incident Summary Reports are prepared and delivered, as specified on [specify locally used format]. All new and open mishaps, including vehicle accidents, incidents, injuries, fires, and any close calls will be described in summary form along with their current status. Negative reports are also required monthly; date due is the 10th day of the month following each month reported. Reports will be delivered to the Center Safety Office, mail code _____.

b. Log of Occupational Injuries and Illnesses. For each location on or off NASA property that performs work on this contract, the contractor will deliver to the Government (under separate contractor's cover letter), a copy of an annual summary of occupational injuries and illnesses (or equivalent) as described in 29 CFR Part 1904.32, Annual Summary. If contractor is exempt by regulation from maintaining and publishing such logs, equivalent data in the contractor's format is acceptable (such as loss runs from insurance carrier). This data will be compiled and reported each calendar year and provided to the Government within 45 days after the end of the year to be reported (e.g., not later than February 15 of the year following).

4.0 HAZARD PREVENTION AND CONTROL. Identified hazards must be eliminated or controlled. In the multiple employer environment of the Center, it is required that hazards including discrepancies and corrective actions be recorded in the Center's information data system (provide name of system here) for risk management purposes. Describe the approach to implementing this requirement.

4.1 Appropriate Controls. Discuss the approach to be used for considering and selecting controls. Discuss the use of the hazard reduction precedence sequence. Discuss the approach to be used to identify and accept any residual risk. Discuss the implementation of controls including verifying their effectiveness. Discuss the scope of coverage (hazardous chemicals, equipment, discharges, waste, energies, or other). Discuss the need for coordination with safety, health, environmental service, and emergency authorities at NASA.

4.1.1 Hazardous Operations. Establish methods for notifying personnel when hazardous operations are to be performed and when hazardous conditions are found to exist during the course of this contract. NASA policy will serve as a guide for defining, classifying, and prioritizing hazardous operations. Develop and maintain a list of hazardous operations to be performed during the life of this contract. The list of hazardous operations will be provided to the contracting officer as part of the safety and health plan for review and approval. The contracting officer and the contractor will decide jointly which operations are to be considered hazardous, with the contracting officer having final authority. Before hazardous operations commence, the contractor will provide a schedule for the development of written hazardous operations procedures with particular emphasis on identifying the safety steps required. The contractor may implement this requirement as follows:

a. Identify contractor policies and procedures for the management and implementation of hazardous operations procedures together with a statement that NASA will have access, on request, to any contractor data necessary to verify implementation; or

b. In lieu of contractor management and development of such procedures, identify the method whereby the contractor will identify and submit hazardous operations procedures to the NASA Occupational Safety Office for review and approval.

4.1.2 Written Procedures. Provide methods to assure that relevant hazardous situations and proper controls are identified in documentation such as inspection procedures, test procedures, or other, and other related information. Describe methods to assure that written procedures are developed for all hazardous operations, including testing, maintenance, repairs, and handling of hazardous materials and hazardous waste. Procedures will be developed in a format suitable for use as safety documentation (such as a safety manual) and be readily available to personnel as required to correctly perform their duties.

4.1.3 Protective Equipment. Describe procedures for obtaining, inspecting, and maintaining protective equipment, as required, or reference written procedure pertaining to this subject. Describe methods for keeping records of such inspections and maintenance programs.

4.1.4 Hazardous Operations Permits. Identify facilities, operations, and/or tasks where hazardous operations permits will be required as specified in the Center's local requirement. Describe the process to be used to ensure guidance adherence to established NASA Center procedures. Clearly state the role of the safety group or function to control such permits.

a. Operations Involving Potential Asbestos Exposures. Describe methods for assuring compliance with the Center's Asbestos Control Program as established in local policy.

b. Operations Involving Exposures to Toxic or Unhealthful Materials. Such operations must be evaluated by the NASA Occupational Health Office and must be properly controlled as advised by same. Describe the process to be used to notify the NASA Occupational Health Office prior to initiation of any new or modified operation potentially hazardous to health and safety.

c. Operations Involving Hazardous Waste. Identify procedures to be used to manage hazardous waste from the point of generation through disposal. Clearly identify divisions of responsibility between contractor and NASA for hazardous waste generated throughout the life of the contract. Operations which occur on site must also be evaluated by the Center environmental services office and must be properly controlled as advised by same. Describe the process to be used to notify the Center environmental services office prior to initiation of any new or modified hazardous waste operation on site.

d. Operations Involving New or Modified Emissions/Discharges to the Environment. Describe methods for identifying new or modified emissions/discharges and coordinating the results with the Center environmental services office. Discuss procedures to minimize or eliminate environmental pollution. Address the management of hazardous materials; substitution of non-hazardous or less hazardous materials for hazardous materials; proper segregation of hazardous wastes from non-hazardous wastes; and other methods described by NASA. Emphasis shall be placed on providing sufficient lead-time for processing permits through the appropriate State agency and/or the Environmental Protection Agency.

4.2 Discuss responsibilities for maintaining facility baseline documentation in accordance with Center requirements. The contractor will implement any facility baseline documentation tasks (including safety engineering) as provided in the contractor's safety and health plan approved by NASA or as required by Government direction.

4.3 Preventive Maintenance. Discuss the approach to be used for preventive maintenance. Describe scope, frequency, and supporting rationale for the preventive maintenance program including facilities and/or equipment to be emphasized or de-emphasized. Discuss methods to promote awareness in the NASA community (such as alerts, safety flashes, or others) when preventive maintenance reveals design or operational concerns in facilities and equipment (and related processes where applicable).

4.4 Medical Program. Discuss the medical surveillance program used to evaluate personnel and workplace conditions, identify specific health issues, and prevent degradation of personnel health as a result of occupational exposures. Discuss the approach for using cardiopulmonary resuscitation, first aid, and emergency response.

5.0 EMERGENCY RESPONSE. Discuss the approach to be used for emergency preparedness and contingency planning that addresses fire, explosion, inclement weather, environmental releases, etc. Discuss compliance with 29 CFR Part 1910.120, Hazardous Waste Operations and Emergency Response, and the role the contractor will play in the local Incident Command System. Discuss methods to be used for notification of Center emergency forces including emergency dispatcher, safety hotline, director's safety hotline, or other. Discuss the establishment of pre-planning strategies through procedures,

training, drills, or other. Discuss methods to verify emergency readiness.

6.0 SAFETY AND HEALTH TRAINING. Describe the contractor's training program including the identification of responsibility for training employees in safe work practices, hazard recognition, and appropriate responses (including protective and/or emergency countermeasures). Address the management techniques used to identify and utilize any Center training resources (such as asbestos worker training/certification, hazard communication, confined space entry, lockout/tagout, or other), as appropriate, with particular emphasis on programs designed for the multiple employer work environment on NASA property. Describe the approach to be used for training personnel in the proper use and care of protective equipment. Discuss tailoring of training towards specific audiences (management, supervisors, and employees) and topics (safety orientation for new hires, specific training for certain tasks or operations). Discuss the approach to ensure that training is retained and practiced. Discuss personnel certification programs. Certifications should include documentation that training requirements have been satisfied and learning validated by one or more of the following: physical examination, testing, on-the-job performance, or other. All training materials and training records will be provided for NASA review upon request.

| TOC | ChangeLog | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | Chapter7 | Chapter8 | Chapter9 | Chapter10-Reserved | Chapter11 | AppendixA | AppendixB | AppendixC | AppendixD | AppendixE | AppendixF | AppendixG | AppendixH | AppendixI | ALL |

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# ACTIVITY HAZARDS ANALYSIS

Overall Risk Assessment Code (RAC) (Use highest code): **M**

Date: 3 April 2014 Project: NASA Goddard Transformers

Activity: removal of existing/ setting new transformer

Activity Location: Greenbelt, MD

Prepared By: Otis McGlothlin- Rental Coordinator

## Risk Assessment Code Matrix

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

| | Probability | | | | |
|---|---|---|---|---|---|
| | Frequent | Likely | Occasional | Seldom | Unlikely |
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

Add Identified Hazards

| | | | | |
|---|---|---|---|---|
| | Site evaluation. | Over head power lines or underground vaults. Equipment tolerances. Automobile and pedestrian traffic. | A full site evaluation conducted by the GC. All work areas, inspected and verified prior to movement of equipment. Traffic control provided by GC in the crane work area. | L |
| | Arrive on job site. | Watch for pedestrians and vehicle traffic. | Ground flagman for vehicles when entering jobsite, casual observers or non authorized workers will not be allowed in crane work area. Any road closures are responsibility of contractor/controlling entity. Operator to complete W.O. Grubb Job Safety Analysis (JSA) prior to starting any work. | L |
| | Set up crane on outriggers and crane mats. | Pinch points, cut hazards hand injuries. Muscle strains or sprains. unauthorized people near crane. | Qualified certified crane operator in charge of crane setup. Wear proper PPE, hands and feet clear of outriggers. Proper lifting techniques. Proper crane set up on mats per manufacture recommendations. Swing radius barricades/tape, casual observers or non authorized workers will not be allowed in crane erection/work area. | L |
| | Install counterweights. | Pinch points. Muscle strains or sprains. Unauthorized people near crane. | Wear proper PPE. Use swing radius barricades/tape, casual observers will not be allowed in crane erection/work area. Qualified certified crane operator in charge of set-up, install counterweights per manufacture recommendations. Keep out of pinch points during counterweight installation. Crane will be operated by trained certified operator in accordance with MOSH and OSHA 1400 crane regulations. Proper lifting techniques. | L |
| | Boom down. | Overhead obstructions, workers around crane. | Casual observers or non-authorized workers will not be allowed in crane assembly/work area, flagman/spotter if necessary. | L |
| | Lower hook ready for contractor's instruction. | Pinch points, cut hazards hand injuries. unauthorized people near crane. | Wear proper PPE. Trained signal person/riggers, sound horn to alert job crane is in motion, casual observers or non authorized workers will not be allowed in crane work/lift area. | L |

# ACTIVITY HAZARDS ANALYSIS

| | | | |
|---|---|---|---|
| Pre-work Safety Meeting. | Items to be discussed include individual injury Strain/Sprain, pinch points, Falling loads, caught in-between, struck by hazards. | Supervisors and employees involved in this scope of work must be clear in their task, aware of potential hazards and necessary measures to be taken to prevent injury and loss of events from occurring. A pre-work briefing of the work to be preformed will be conducted including a thorough review of the AHA and JSA. All workers involved are required to wear the proper PPE for task being performed. Emergency services and/or medical clinic locations will be addressed in case of emergency | L |
| Crane Work. | Equipment/rigging failure ie. Wire rope load line, hydraulic hoses, operational aids, slings, chokers. Control of load being lifted. Hydraulic or fuel oil spill. Individual injury Strain/Sprain, pinch points, Falling loads, caught in-between, struck by hazards. Pinch points, cut hazards hand injuries. Weather hazards. | Cranes will be inspected, tested and certified before use as well as daily inspections of crane components by trained certified operator. W.O Grubb operator will fill out company JSA prior to any work beginning. Trained signal person/riggers to direct crane and rig loads. Tag lines will be utilized on all loads lifted. The crane carriers a "Spill Kit" to aid in containing any hydraulic or fuel oil spills. In the event of a spill the controlling entity will be notified and proper procedures implemented for clean up. All rigging will be tagged with capacity and inspected for damage prior to use. Unsafe or damaged equipment shall be tagged and removed from service in accordance with company policy and with section 18 of the EM 385.1.1. Only authorized personnel will be allowed in fall/lift zone. Use appropriate PPE, ie.gloves hard hat, safety shoes. Competent trained riggers to perform rigging inspections and rig all loads. Wind restrictions in accordance to manufactures' recommendation. Operator may stop lifting operations in the event of any unsafe weather conditions i.e. Lightning, fog excessive wind speed. | M |
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Add Items

# ACTIVITY HAZARDS ANALYSIS

| | | | |
|---|---|---|---|
| | Grove GMK 6350- 350 ton crane | NCCCO Certified Operators | Crane - Annual certification, monthly and daily inspections or may require onsite 3rd party inspection. All rigging will be tagged with capacity and inspected for damage prior to use. Unsafe or damaged equipment shall be tagged and removed from service in accordance with company policy and with section 18 of the EM 385.1.1 |
| | | | All rigging will be tagged with capacity and inspected for damage prior to use. Unsafe or damaged equipment shall be tagged and removed from service. |
| | | | All rigging will be tagged with capacity and inspected for damage prior to use. Unsafe or damaged equipment shall be tagged and removed from service. |
| | | | |
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| | | | |
| | | | |

**Involved Personnel:**

**Acceptance Authority (digital signature):** _____

# SAFETY PLAN REQUIREMENTS

**Minimum requirements in addition to GPR 8715.3 Appendix E**

- ❑ **Description of the work to be performed on site including unique hazards likely to be encountered.**
- ❑ **Contractor's on site safety point of contact.**
- ❑ **Contractor's statement of policy regarding enforcement of safety and health program requirements.**
- ❑ **Contractor's safety program objectives.**
- ❑ **Responsibilities of contractor's key personnel.**
- ❑ **Extent of safety meetings, surveys and inspection reports.**
- ❑ **Type(s) of personal protective equipment required, under what circumstances it will be used, and how its use will be enforced.**
- ❑ **Safety training required for the tasks to be performed including certification and/or recertification where applicable.**
- ❑ **GSFC emergency procedures defined including instruction on notification of incidents to the Emergency Console.**
- ❑ **Methods to comply with the requirement for immediate reporting of accidents to the Contracting Officer.**
- ❑ **Statement that the contractor will not invalidate the integrity of safety systems without proper authorization.**
- ❑ **Procedures for emergency actions to be taken to secure dangerous conditions, to protect personnel and security of work areas in the event of an accident or an act of nature.**
- ❑ **Procedures for securing an accident site so that the area remains secure until the arrival of GSFC Safety or Environmental personnel. Accident scene shall remain secure until released by the Contracting Officer and/or GSFC Safety and/or Environmental personnel.**
- ❑ **The plan must reference the following documents:**

1. **NPR 8715.3 (Feb. 2011) NASA General Safety Program Requirements ***
2. **NPR 8621.1 - NASA Mishap and Close Call Reporting, Investigating, and Recordkeeping ***
3. **USDOL/OSHA Standards (29 CFR 1910 or 29 CFR 1926 as applicable)**
4. **Any state, county and/or local safety codes as applicable.**

*** Available at http://nodis3.gsfc.nasa.gov/library/main_lib.html**

- ❑ **Contractors past performance with respect to NASA contracts (brief statement):**

- ❑ **Contractor's past performance with respect to DOL/OSHA and/or State Plan compliance (brief statement):**

- ❑ **Contractor's Injury/illness rates (include most recent statistics):**

**Comments:**

## Goddard Space Flight Center Mobile Crane Lift Plan

| | |
|---|---|
| 1. Company Name | |
| 2. Name of Person Preparing Lift Plan / Date | |
| 3. Project Name and Location | |
| 4. Load Description | |
| 5. Crane Description- Type, Manufacturer, Model # (multiple crane lifts need a lift plan for each crane) | |
| 6. Lift Description(attach diagram of lift and load placement) | |
| 7. Load Condition (describe) | |
| 8. Known Center of Gravity (attach diagram) | |
| 9. Source of Load Weight (attach a copy of drawings, calculations, bill of lading, etc.) | |
| 10. Load Weight Empty | Lbs. |
| 11. Weight of Load Contents / Fluids | Lbs. |
| 12. Weight of Auxiliary Block | Lbs. |
| 13. Weight of Main Block | Lbs. |
| 14. Weight of Lifting Beam | Lbs. |
| 15. Weight of Slings, Shackles, Other Rigging (see block 52) | Lbs. |
| 16. Deduction for Jib / Fly (if applicable) (see block 33) | Lbs. |
| 17. Weight of Hoist Rope (if applicable) | Lbs. |
| 18. Weight of Auxiliary Head / Rope (if applicable) | Lbs. |
| 19. Additional Deductions (list if applicable) | Lbs. |
| 20. **Gross Load (add block 10 – 19)** | **Lbs.** |

**Goddard Space Flight Center Mobile Crane Lift Plan**

| |
|---|
| 21. Boom Configuration |
| 22. Boom Length at pick-up Feet |
| 23. Boom Length at set down Feet |
| 24. Counterweight Lbs. |
| 25. Boom Angle at Pick-up (if applicable) Degrees |
| 26. Radius at Pick-up (if applicable) Feet |
| 27. Boom Angle at Set-down (if applicable) Degrees |
| 28. Radius at Set-down (if applicable) Feet |
| 29. Capacity at minimum boom angle / maximum radius (attach copy of actual load chart used) Lbs. |
| 30. Maximum Load on crane for this lift (Gross load from block 20) Lbs. |
| 31. Percentage of crane's rated capacity in this configuration % |
| 32. JIB /FLY Erected:_____ Stowed:_____ Stored:_____ |
| 33. If JIB / FLY is used: Length: _____ Angle:_____ |
| 34. Rated Capacity of JIB / FLY from chart . |
| 35. Weight of JIB if installed but not in use: _____ Lbs. |
| 36. Soil Conditions / level/ underground hazards/ crane mat required? |
| 37. Outriggers (full/partial)/ pads / matting / on rubber? |
| 38. Buildings, equipment, or structure to lift / swing over? |
| 39. Travel required? ___ YES ___NO |
| 40. Working quadrants / swing restrictions? |

| |
|---|
| 41. High voltage / electrical hazards / other hazards? |
| 42. Other considerations? |
| 43. Slings (number, size, type) |
| 44. Slings rated capacity per configuration (see block 45) |
| 45. Total weight of slings Lbs. |
| 46. Hitch (vertical, basket, choker) Sling configuration angle: _____ Degrees Factor: _____% |
| 47. Shackles (number, size) |
| 48. Shackles rated capacity: Lbs. |
| 49. Total Weight of shackles Lbs. |
| 50. Spreader Beam/other rigging required? (type, size, capacity) |
| 51. Weight of spreader beam/other rigging: Lbs. |
| 52. Connection to Load Capacity each (lugs, bollards, pad eyes, none) |
| 53. Total Weight of all rigging (total of blocks 44, 48, 50 & 52) Lbs. |

REQUIRED ATTACHMENTS:

1. Load Placement diagram showing location of pick and final place points.
2. Rigging diagram with sling angles, expected loads and load CG.
3. Photocopy of actual LOAD CHARTS used to calculate crane capacity.
4. Rigging certifications.
5. Rigging load limit charts (Safe Work Load Limit).
6. Crane certification (Annual/Daily Checklist).
7. Operator's Certification.
8. Rigger's Certification.
9. Narrative of lift procedures.
10. Source of load weight (see blocks 8 and 9).

# Goddard Space Flight Center Mobile Crane Lift Plan

INSTRUCTIONS:

1. Name of contractor (company) performing the lift.
2. Name of person preparing this lift plan & date prepared.
3. Project name and actual location of lift.
4. Describe the load and any special considerations.
5. Self explanatory
6. Brief description of pick-up and placement of load. Attach diagram.
7. Describe the load and any special considerations (e.g., dry, solid, filled with liquid, stable, unstable, etc.)
8. Is the load's center of gravity known? If so, where is it documented? Attach diagram.
9. Document source of load weight (e.g., drawings, calculations, bill of lading, etc.)
10. Self explanatory
11. Self explanatory
12. Self explanatory
13. Self explanatory
14. Self explanatory
15. Self explanatory
16. Self explanatory
17. Self explanatory
18. Self explanatory
19. List all additional deductions and weights
20. Add blocks 10 through 19
21. Describe boom configuration. Refer to manufacturer's terminology.
22. Self explanatory
23. Self explanatory
24. Self explanatory
25. Insert value if load chart uses boom angle
26. Insert value if load chart uses radius
27. Insert value if load chart uses boom angle
28. Insert value if load chart uses radius
29. Crane's rated capacity at minimum boom angle / maximum radius. Figure worst case between pick and place.
30. Copy gross load from block 20
31. Block 29 divided by block 28.
32. Check to indicate Jib/fly is erected, stowed or stored off of the crane.
33. If Jib is used, enter the length and angle of the boom.
34. List the JIB capacity from the load chart.
35. The weight of the JIB if it is installed on the boom, but not used during the lift.
36. Describe site, soil, stability conditions and any underground hazards or concerns.
37. Describe outrigger setup and required matting (if applicable).

38. Describe considerations for buildings, structures, or equipment which will be under the load during the lift.
39. Describe craen travel with load on the hook (if applicable).
40. Describe planned crane working quadrant(s) and any swing restrictions.
41. Describe any electrical hazards or concerns in close proximity to the crane.
42. Describe other considerations of note such as restricted head room, use of taglines, reduced wind limitations, traffic control, etc..
43. Describe slings to be used.
44. List the maximum rated capacity the sling can lift in pounds.
45. The weight of the sling to be used.
46. The type of hitch (vertical, choker, basket) to be used and its sling configuration angle and factor.
47. Describe shackles t be used (number & size).
48. The maximum rated capacity of each shackle in pounds.
49. The total weight of all shackles used.
50. Describe spreader beam / other rigging used. State type, size, capacity.
51. Self explanatory.
52. Self explanatory.
53. The total weight of all rigging that will be used.